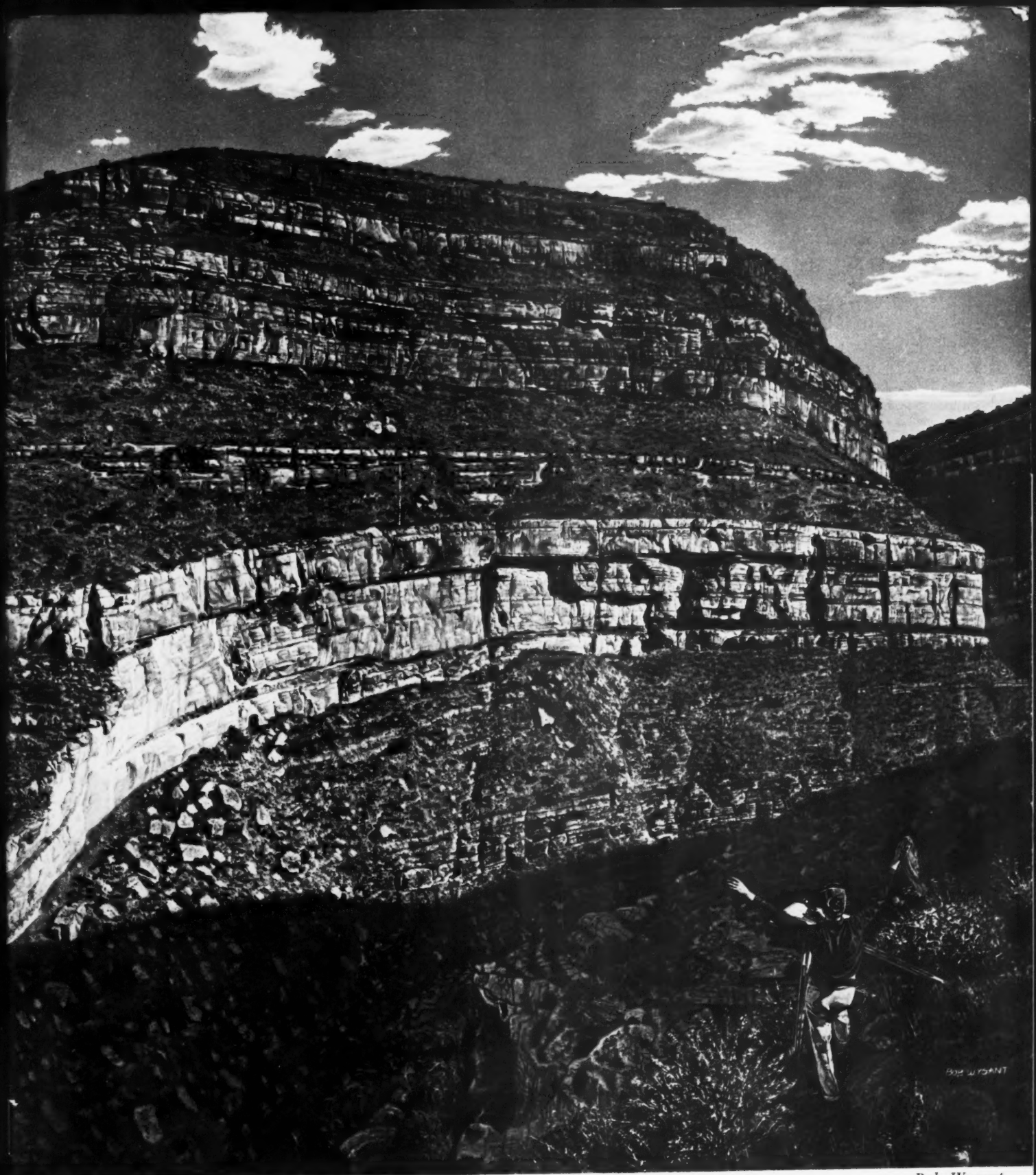
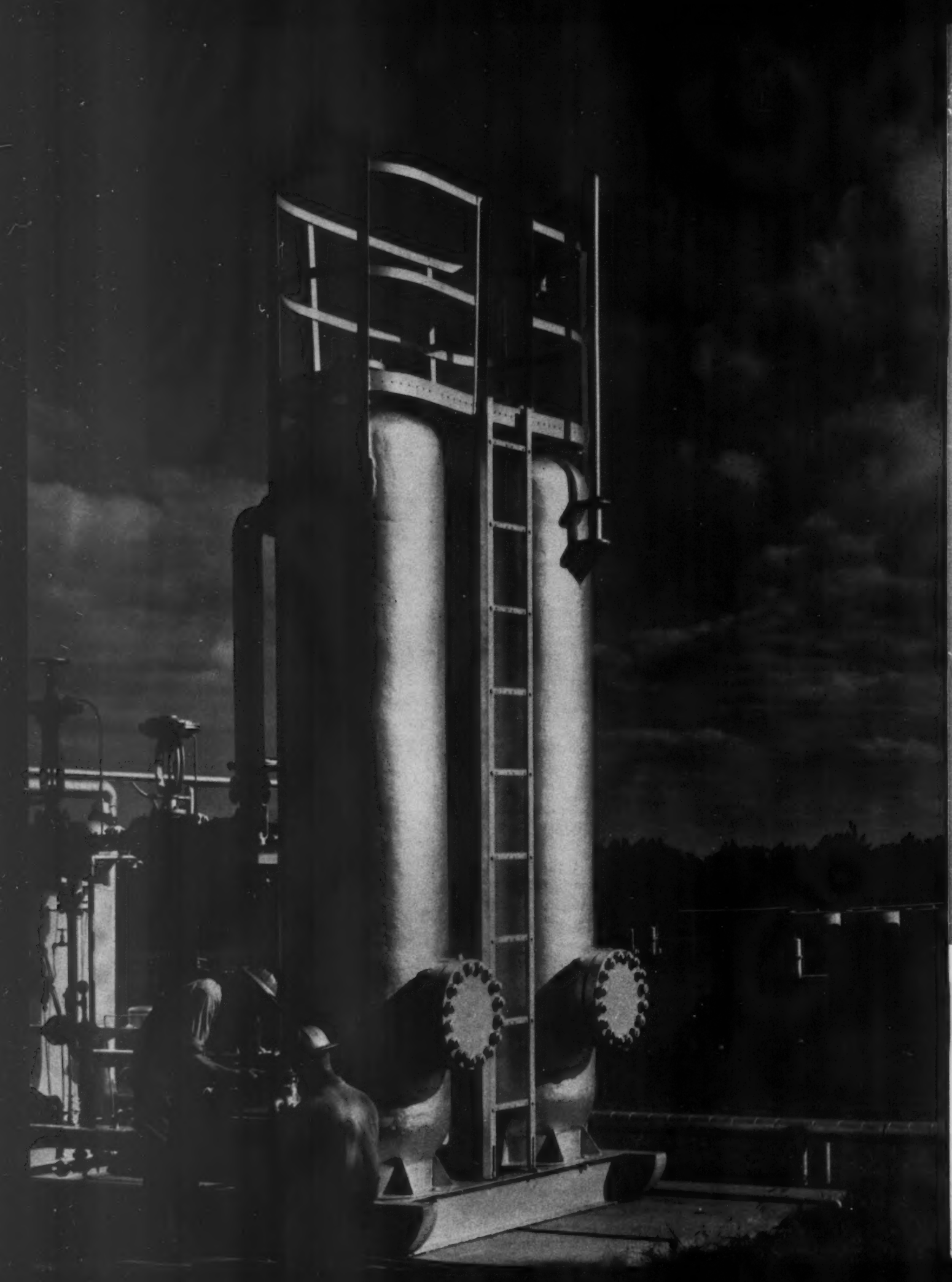


Mapping Surface Geology

Bob Wygant

The HUMBLE WAY

JANUARY-FEBRUARY, 1955



The HUMBLE WAY
January-February, 1955
Vol. X No. 5

For whom *is* the bell tolling?

> No man is an island, entire of itself. Every man is a piece of the continent, a part of the main. If a clod be washed away by the sea, Europe is the lesser as well as if a promontory were . . . Any man's death diminishes me because I am involved in mankind. And therefore never send to know for whom the bell tolls. It tolls for thee.
>
> —JOHN DONNE

AMERICA'S gas producers can hear it loud and clear, and they know it tolls for them.

The first tug on the bell-rope came last June when the Supreme Court handed down its five-to-three decision in the Phillips Case. By its new interpretation of a 1938 law, the Court authorized the first peacetime attempt to control the production and fix the prices of a consumer commodity—natural gas—and to treat its competing producers as public utilities.

But the bell of federal encroachment also tolls for many other Americans.

As of now, only natural gas has been singled out for federal price-fixing. Tomorrow, it may be oil or coal, cattle or cotton, or any one of a thousand other products. The precedent has been set for clamping federal price-controls on any commodity, including the labor of individuals.

Benjamin Disraeli, the British statesman, once said: "A precedent embalms a principle." In this case, the principle embalmed may very well be that of free competitive enterprise.

So send not to know for whom the bell tolls. It tolls for every believer in America's time-tested economic system.

Gas producers are not alone in their belief that the Supreme Court decision in the Phillips Case is not in the public interest. Leaders in government, in industry, and in agriculture, in public statements and resolutions, have expressed concern over the unprecedented move for federal control. The following are excerpts from such statements and resolutions:

Overturns All the Precedents . . .

Whatever the intentions, whatever the desires, we must be controlled only by the obvious meaning of the law as it is, and, as it is now, the law emerging from the Supreme Court may well have wrought a basic change in the design of our government.

The first and most immediate effect of the Court's decision is that the federal government has been placed in a position to dominate the regulation, production, and utilization of the energy resources of the United States.

The second consequence is of even greater importance. The Supreme Court's rule, laid down in the Phillips decision, overturns all the precedents of our national experience by removing from the states the right to exercise the

Dehydrating natural gas before it goes into pipe line, an expense borne by many of the more than 4,000 gas producers in the nation.

Some Pertinent Comments on

police powers reserved to them by the Tenth Amendment as a part of the Sovereign Bill of Rights.

Federal control of natural gas production and gathering is, as of now, a reality—a hard reality, but the significance extends far beyond natural gas itself. The federal government now has the power to fix arbitrary and changing prices for this commodity; it has the power to allow or disallow private profit; it has the authority to decide whether gas shall be sold or not sold, and necessarily it may determine selectively the uses to which the gas shall be put.

—Allan Shivers
Governor of Texas

We Must Not Be Lulled to Sleep . . .

A chaotic condition exists within the industry. It is obvious that this high risk industry cannot continue to explore and develop the necessary reserves upon a public utility base of price fixing. Regardless of recent statements by those in high authority that the Federal Power Commission is not bound to fix field prices of natural gas upon the same basis as is used in rate making for public utilities, we must not be lulled to sleep. We must remember that the complexion of all bureaucratic control changes from time to time.

The producers of natural gas can continue to find and develop necessary reserves only under a free economy and upon a competitive basis, and it is to be remembered that natural gas is being furnished in the large consuming areas at far distances from the large sources of supply in competition, price-wise, with all other types of fuel energy.

Federal bureaucratic control of the oil and gas industry has now driven its entering wedge and the ultimate results may be complete federal control over the oil and gas industry, even to the entire destruction of reasonable regulation of this industry under state enacted and enforced conservation statutes. This is not in the public interest. It can only result in diminishing supplies and increased prices in the large consuming areas. Advocates of public utility type of control of this industry are nearsighted and wholly fail to see the long range results.

—William G. Stratton
Governor of Illinois

War Between Free Enterprise and Socialism . . .

Fixing of prices by government on gas at the wellhead is unnecessary and unjustified. It is without good purpose or wholesome effect. It can only be destructive. We do not have to speculate about the results. We have not forgotten the experience of the late and unlamented OPA which attempted to carry on its wartime activities after peace had come to our country. We know that this experience in peacetime price fixing brought about scarcity, rationing and high prices at the consumer level. That is the inevitable result when incentive is destroyed.

Abundance can be obtained only through the operation of a free economy. It has never been otherwise, and it never will be. Boiled down to its simple essentials, this effort to keep natural gas production under federal control is just another crucial battle in the never-ending war between free enterprise and socialism.

If it is to the advantage of the consumer for the government to fix the price of gas at the wellhead, it is to his even greater advantage to fix the prices for coal, wheat, cotton, wool, and automobiles at the point of production. Here and now is the time to settle this issue. If the people want socialism, now is the time to find it out. You and I know that they do not. We have no doubt as their response once they are in possession of the facts.

—Walter S. Hallanan
Chairman, National
Petroleum Council

Would You!

Take first the producer or gatherer who is now delivering gas to a pipeline company but who has not fully developed his acreage. Assume that the pipeline company's volumes of gas are declining or that it wants more gas to deliver to its customers. Will the producer drill another well costing $100,000 or more, not knowing whether it will be a dry hole or a success, and not knowing, if it should be a success, what price a governmental agency will allow him to charge for his gas? Would you?

Or take the producer or gatherer who has not yet contracted his gas acreage but from whom an interstate pipeline company wants to buy his gas. Under the present order (FPC Order 174-A) of the Commission, if he ever starts delivering gas to the pipeline company, even under a contract for a temporary supply, he has no assurance that he can ever get loose. He really has a long-term contract. Can he afford to contract with a pipeline company knowing that, if he does, he may be tied up with it forever and knowing that, after he takes the risk of drilling his wells, the Commission may deny him his contract price? Would you?

—K. S. Adams
Chairman, Phillips
Petroleum Company

Confiscation . . . Will Not Produce Gas . . .

It seems quite clear that the American people are facing a very serious problem in this matter of regulation by a federal agency of prices at which producers may sell gas in interstate commerce.

It is pertinent to inquire what the American people want. Do they wish to allow gas producers to operate in a free competitive economy and to permit the producers' prices to be determined by competition? Or are they content to permit the Federal Power Commission to regulate producers' gas prices in such a manner as not to reflect market conditions and to face the practical certainty of shortages, rationing and subsidies?

Would they like for the Federal Government to take over, own and operate the gas-producing industry? If so, do they wish to pay the producers for the gas reserves which may be taken over by the government, or do they wish either in whole or in part to try the Mossadegh approach of confiscation?

the Natural Gas Question . . .

Confiscation did not produce oil in Iran and will not produce gas in America.

It seems quite clear that the American people will have to make their choice. Shall we have a free producing industry operated through the gas producer, or shall the Federal Government take over in one way or another? It is crystal clear that the producing end of the gas industry cannot exist half free and half slave. It must be all one or the other.

—Rex G. Baker
Vice President,
Humble Oil & Refining Co.

Competition Regulates Price Adequately . . .

Where a particular field of regulatory activity can be adequately undertaken by state governments, we are opposed to federal regulation. We are opposed to the extension of price regulation in circumstances in which competition is effective as a regulatory factor. Since the field price of natural gas is adequately regulated by competition, we favor legislation providing that field prices of natural gas shall not be regulated by the Federal Power Commission.

—From a resolution adopted by Farm Bureau Federation, New York, December, 1954

Opposed to Price-Fixing . . .

The Grange is opposed to permitting the Federal government to fix the price at which the landowner or producer sells natural gas. Because a recent decision of the United States Supreme Court grants the Federal Power Commission the power to fix the price of gas at the wellhead, we believe the Natural Gas Act should be amended to prevent the Commission from using this power.

—From a resolution adopted by the National Grange, Seattle, November, 1954

Fundamentally and Dangerously Wrong . . .

We believe this (Phillips Case) decision is fundamentally and dangerously wrong and strongly recommend to the Congress that appropriate legislation be enacted redefining the powers of the Federal Power Commission and, in such redefinition, to clearly and firmly state that neither that agency nor any other agency of the Federal Government shall have the power to encroach upon the prerogatives and long established practices of the respective states nor upon the intrinsic and inalienable rights of individual citizens, nor to fix prices in any competitive business.

—From a resolution adopted by National Wool Growers Association, Salt Lake City, December, 1954

No Need For Price Regulation . . .

Inasmuch as the field price of natural gas is adequately regulated by free competition, there is no need nor justification for such price regulation by the Federal Power Commission as is now being undertaken under the so-called "Phillips" decision of the Supreme Court. While regulation of prices charged by public utilities is entirely proper, the gas producing business has none of the characteristics of a public utility.

We are opposed to the extension of price regulation in circumstances in which competition is effective as a regulatory factor. We are also opposed to Federal regulation in any area in which State regulation is applicable as is true for the conservation of natural gas.

We strongly favor Congressional legislation to make doubly clear that the Federal Power Commission have no control over the field price of natural gas, regardless of who produces it. That Congress has intended this all along is shown by its original provision in the Natural Gas Act of 1938, expressly exempting production and gathering from Federal Power Commission jurisdiction, and is also shown by the provisions of the Act passed in 1950 reiterating this purpose.

—From a resolution adopted by Texas Daily Newspaper Association February 5, 1955.

Road To Centralization Of Power . . .

Gas is an important product of ranch and farm land, the production of which has none of the characteristics of a public utility business, but is a risk-taking, competitive business . . . A free, competitive market for the products of our soil has fostered the greatest possible production of needed products to the benefit of all . . . This decision in the Phillips case will take from the individual the right to control his property and put that power in the hands of the Federal Government and take us further on the road to centralization of power in the Federal Government . . .

This decision disregards the time-honored practices developed under state governments and under the American doctrine of sovereignty of the states in state affairs . . . Such power by the government may well be the beginning of laws to regulate all industries in this country, including the livestock industry . . .

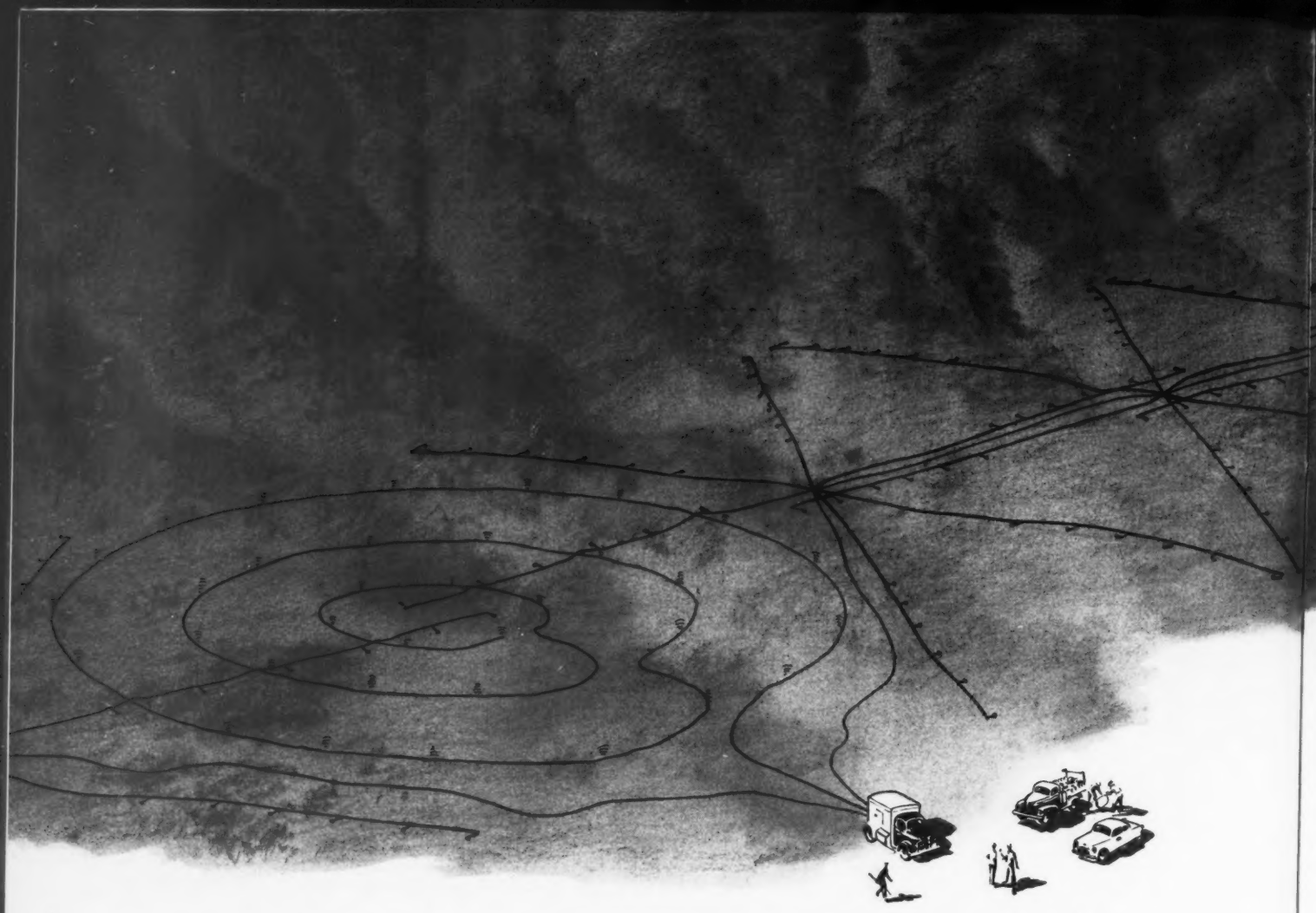
We recommend to Congress that legislation be enacted to re-define the powers of the Federal Power Commission and that such definition state that the Federal Government may not encroach upon the prerogative and long established practice of the states or the rights of individuals, not to fix prices in competitive business.

—From a resolution adopted by American National Cattlemen's Association, Reno, Nevada, January, 1955

Unwarranted Encroachment . . .

The Council reaffirms its opposition to the unnecessary and unwarranted encroachment of the Federal Government upon the constitutional powers of the individual States . . . A flagrant example of such encroachment is the fixing of natural gas prices by the Federal Power Commission at the local fields where the gas is produced . . . The Council supports an amendment to the Natural Gas Act which would prohibit this practice.

—From a resolution adopted by The National Cotton Council, Houston, January, 1955.



STAR PATTERNS

New technique makes seismograph exploration more complex but it produces good pictures where older methods failed

WORKING in the rugged brush country of Southwest Texas a few years ago, Humble Seismograph Party No. 6 was having its troubles. The seismic instruments couldn't get a "picture" of the subsurface strata.

Time after time the crew carried out the standard procedures. They loaded the shot hole with dynamite, laid out the two long seismic cables, attached pickup geophones at intervals along the cables, and made their shot. Each time, when the paper record was developed, it showed only a scramble of zig-zag lines that defied any attempt at useful interpretation.

The situation was discouraging, but not unique. For 20 years seismograph parties had been running into such areas — particularly in the Edwards Plateau — where they could not get satisfactory pictures. For some reason, seismic shots set off in these areas created peculiar "disturbances" which interfered with the normal reflections from below and made the recording instruments go crazy. Apparently nothing could be done about it.

This time, however, something was done about it. Three of Humble's seismic trouble-shooters arrived on the scene, bringing a car full of extra geophones and some interesting theories about how to use them. If the theories were right, they should be able to get a seismic picture.

Willingly, the seismograph party members pitched in to help test the researchers' theories. Three times they struggled through the thick brush to lay out the seismic cables and place the unusually large number of geophones in different designs as directed by the research men. Three times they set off the explosive charge in the shot

SIMPLIFIED DRAWING of a typical six-point star pattern layout shows circular shot-hole pattern, left, and one leg of the main seismic cable with six pickup patterns in place. The other cable, with identical patterns arrangement, is out of the picture at lower left.

Individual stars may be difficult to perceive, even in this simple sketch, because the patterns overlap. Note that two points of each star are laid parallel to the main cable and the other four points form a large X. The repeated Xs create an illusory diamond design.

This arrangement of star positions simplifies the work of crew members who must walk the length of each star point to attach and remove the geophones. After each seismic shot, 432 geophones and connecting cables must be picked up and reassembled in a new position.

The sketch shows three cables leading to the instrument truck at the bottom. One is the shot cable which is laid out in three circles so as to connect all 36 shot holes for simultaneous explosion. The other two are the main seismic cables through which impulses from the geophones are transmitted to the recording instrument in the truck. Each star makes one trace on the seismic record.

hole and checked the results on the paper records.

And twice they failed. But the third shot, made with 330 geophones arranged in a series of 11 star-like patterns, produced an orderly and well-defined seismic picture of the strata below.

This seismic shot proved that the theory of **star patterns** was sound, and that this arrangement of geophones could effectively overcome the troublesome seismic disturbances and produce a clear picture. It opened the door to successful seismograph operations in many problem areas of the world which had heretofore proved unsuitable for seismic exploration.

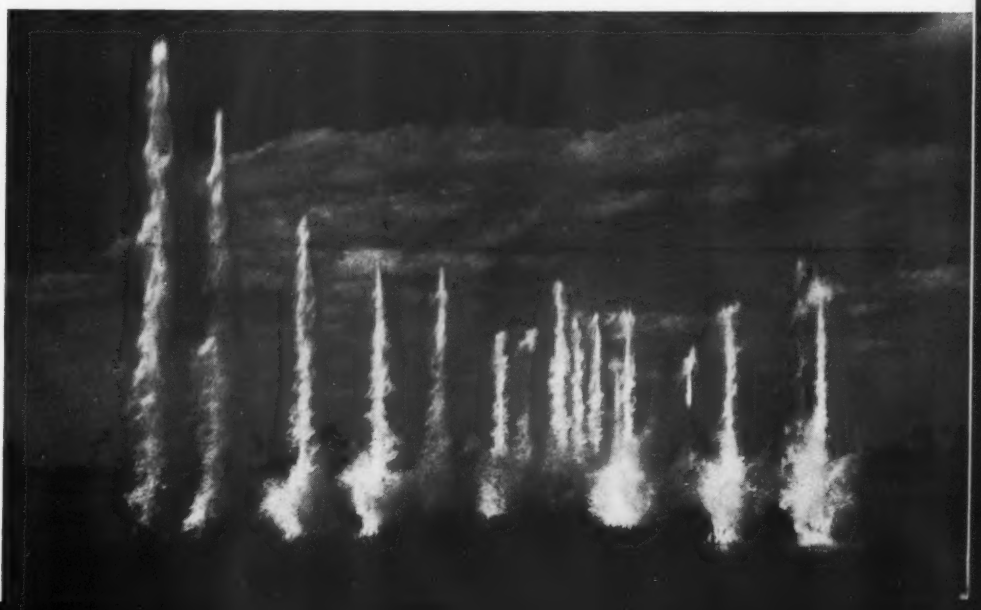
The basic star pickup pattern, as developed by Humble, actually resembles the spokes of a giant rimless wheel more than it does the usual concept of a star. The center point, or hub, is located on the main seismic cable, and the spokes radiating from this point are 210-foot lengths of cable. Six geophones are spaced out along each of these spokes. In the lingo of seismograph exploration people, each spoke is a "point," and the rimless wheel is a "star."

A typical star pattern set-up (see sketch above) may have 12 stars stationed at 200-foot intervals along the two main cables extending in opposite directions from the shot hole area. The geophones are connected so that all the pickups in each star combine to make a single trace line on the seismograph record.

That the star pattern method can give successful results where the conventional "in-line" method fails is attributable to two basic facts:

1. The use of numerous geophones in place of one gives a better pickup of the seismic echoes. It is an adaptation of the two-heads-are-better-than-one logic.
2. The horizontal star pattern in which the geophones are arranged has a focussing effect which gives a more selective

Dancing water spouts erupt as multiple hole seismic shot is set off in water-covered Florida area. In dry land operations there is usually little or no "blow" from shots.



Hundreds of geophones like these are used in each star pattern shooting spread.

Simple air blower unit, mounted on bed of this shot hole drilling truck, provides enough air to drill shallow holes, eliminates need for large compressor and truck.

pickup. Disturbance waves traveling near the surface tend to cancel each other out in the pattern of geophones, thus permitting the desirable reflections from below to dominate the message transmitted to the recording instrument.

Originally the star patterns were used with a single shot hole explosion, just as was customary with the conventional "in-line" seismograph method. Humble's men soon discovered, however, that better results could be obtained by using multiple shots of smaller charges in a pattern of shallow holes. This pattern is in the form of three progressively smaller circles, one within the other. Six shallow holes are drilled on the inner circle, 12 on the next larger circle, and 18 on the outer circle. When small explosions are set off simultaneously in all 36 holes, even waves of energy are directed downward by the pattern.

Although the new star pattern method of seismograph operations offered important advantages, it also posed some peculiar problems. For one thing, it created an immediate demand for large quantities of geophones. Working in close cooperation with the manufacturers, Humble's engineers helped in designing a practical, more compact type of geophone that could be mass produced at low cost.

In the field, seismograph party members were confronted with the problem of handling the greatly increased footage of seismic cable needed for the star pattern method. Humble crews soon abandoned the familiar drum reel in favor of a simple open bin with a spinner wheel device—developed by an affiliate, Carter Oil Company—to pull the cable into the bin. Oddly, the loose cable does not become tangled in the box and can be easily pulled out again for the next set-up.

Many other standard operating procedures had to be altered for the star pattern method, and more men had to be added to the seismograph parties. As the crews became more familiar with the new method they found ways to speed up the operations. Even so, it still takes about 40 per cent longer to shoot a given area with star patterns than with the former method. Generally, the improved results are well worth the additional expense.

Drilling With Air

But the biggest stumbling block to the use of star patterns in West Texas and New Mexico was the high cost of drilling the multiple shot holes. Drilling with water or mud is impractical in many parts of this semi-arid region because of the scarcity of water. Often, attempts to drill with water hauled in by tank truck also have proved futile because the water was quickly lost in underground crevices.

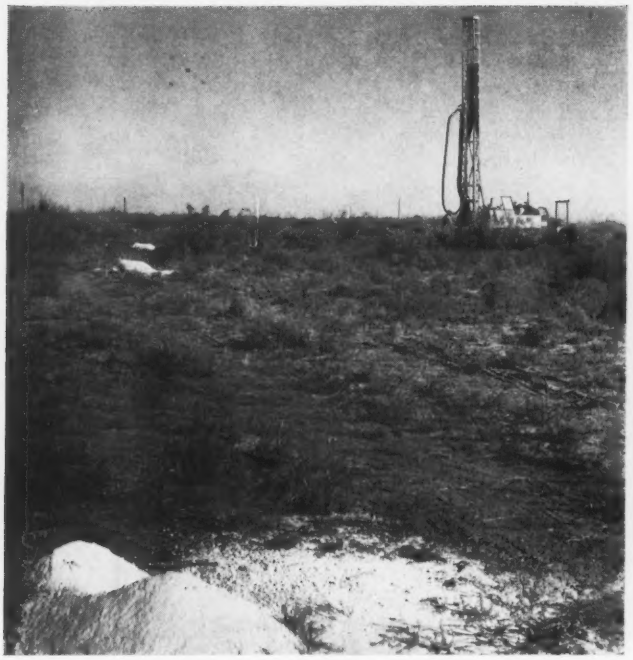
These water problems were first overcome by adopting the compressed air method of drilling in which the cuttings are blown from the hole by air pressure. But Humble's seismograph parties found this method also too expensive. In addition to the drilling rig truck, it was necessary to have a truck for the big air compressor. The compressor alone cost about $9800, to which had to be added the cost of the truck and the wages of the truck driver. And for every five compressors in the field, a maintenance man had to be hired to keep them in running condition.

Here again, Humble's scientists came up with a solution to the problem. They found, by study and experiment, that a large volume of air under low pressure is just as effective in removing the drill bit cuttings from shallow holes as the high pressure air provided by the compressor. By enlarging all orifices and channels through which the air had to pass to get to the bottom of the hole, the research men were able to substitute a simple blower fan for the giant compressor. The blower fan unit, which costs about $300, eliminates the need for the expensive compressor and the compressor truck. It also frees the truck driver and the maintenance man for other duties in the seismograph party.

All of these developments—the star patterns, the multiple shot hole patterns, the air blower for drilling—are important contributions to the progress of oil exploration. Many companies are now using adaptations of the star pattern method in various parts of the world.

Research and the ingenuity of American oil men have removed one more obstacle in the continuing search for oil to meet the needs of the world.

Locating shot hole points, engineer uses sighting device which won Coin-Your-Ideas award for another Humble man.



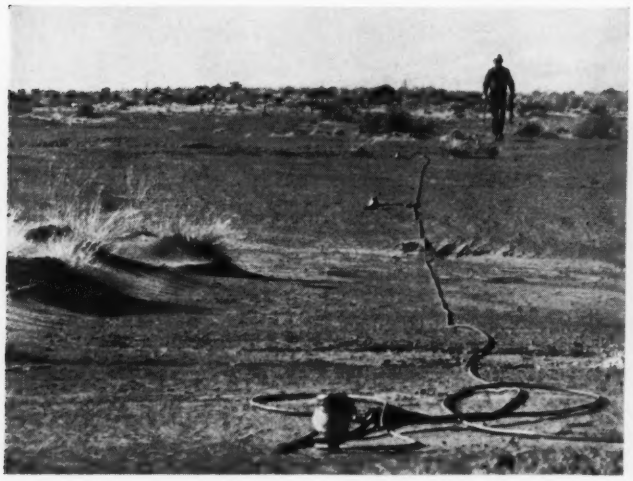
Drilling multiple shot holes with air instead of water, contract driller uses air blower unit developed by Humble.

Party No. 18 Shoots Star Patterns in West Texas

These pictures show members of Humble Seismic Party No. 18 at work on the high plains near the New Mexico state line, where they were carrying on a typical star pattern shooting operation. The 15-foot deep multiple shot holes were being drilled by a contractor who used three drilling trucks equipped with air blowers instead of compressors.

The party found that satisfactory seismic pictures could be obtained in this area with four-point star patterns. Using this simpler pattern, members of the party were completing about ten seismic shots a day.

Loading each shot hole with two-pound charge of dynamite, member of crew uses a converted caddy cart to save labor.



Picking up geophones after the shot is made, crew member prepares to move the spread to new position for next shot.

Recovering cable after geophones have been removed, crew members use spinner device to pull cable into truck bin.

a NEW for Texas

Over a dusty Texas road, another fleet of test cars checks the performance of all new Humble Esso Extra for '55.

ONE of Humble's most closely guarded secrets of 1954 barely made it into the new year.

Humble salesmen were "let in" on it January 3 over Texas' first closed circuit telecast. The public heard about it soon after through newspapers, television and radio, on poster boards and at Humble stations.

The big news was that Humble had introduced a new gasoline—Esso Extra for '55—the highest octane rated motor gasoline ever marketed in the state of Texas. A nationally circulated oil and gas magazine termed the development a real "shocker" in the industry.

Some motorists may wonder why Humble went to the effort and expense of producing a new Esso Extra when the Company has led the state in tax-paid gasoline sales for nearly four years. There are two reasons, Humble officials say:

1. To meet and exceed the demands of new high compression engines and automatic transmissions.
2. To supply customers with a premium gasoline that is noticeably outstanding in performance qualities.

Take that first item—exceeding the demands of new high compression engines and automatic transmissions. Published facts and figures reveal that 1942-1949 automobiles had comparatively low compression-ratio engines. Manual gear shifts made few demands as far as anti-knock was concerned and cars operated efficiently on 90-93 octane fuel. Esso Extra met and exceeded the performance demands of these cars.

Since 1949, however, engine compression ratios have increased steadily. The ratios ranged between 5½ and 6 to 1 in 1949; in most of today's cars ratios range between 8 and 9 to 1. This most recent compression ratio increase called for a tremendous jump in anti-knock requirements and performance qualities of the gasoline.

The introduction of automatic transmissions also imposed new demands on gasoline. Automobiles with these new drive systems frequently knocked—on the same gasoline which provided anti-knock power in manual gear shift cars. Engineers say this resulted from the constant and sometimes overpressing load applied to automatic transmission engines—sometimes at low speeds and sometimes at higher speeds. It was simply a case of too much pull for not enough power—like climbing a steep hill in high gear.

Other problems due to recent automotive design changes which have brought on increased octane demand include combustion chamber deposits, spark plug fouling and high valve temperatures.

Everything spelled the need for a more powerful, more highly refined and blended high octane gasoline—

The technical story of high compression engines and the new high octane Esso Extra for '55 was told by Fred L. Witt, head of sales technical service division.

gasoline motorists

Sales Manager F. A. Watts, on screen, and other executives told the story of new gasoline at closed circuit meetings in 10 Texas cities, like this one in Houston.

even better than pre-'55 Esso Extra.

The second reason for the development of Esso Extra for '55 is Humble's pledge to supply customers with a premium gasoline unrivalled in quality. In 1946, shortly after V-J Day, when Esso Extra was first marketed, it was the highest octane rated gasoline produced in Texas and enjoyed a wide margin of superiority over all other motor gasolines.

From 1946 to 1954, Esso Extra was continuously improved and soon earned the rating as No. 1 in Texas. However, during this same period of time, other refiners also began to produce better gasoline and in recent years have narrowed Humble's quality leadership.

It was at this point that Humble decided to develop Esso Extra for '55.

Humble research specialists and technicians consolidated their studies on high compression engines, automatic transmissions and other new automotive developments. They segregated and blended the performance characteristics they wanted from the total kinds of gasoline components available.

From research laboratories, the blueprint of Esso Extra for '55 went to Humble's Baytown Refinery where complicated gasoline manufacturing techniques and equipment were put into operation by experienced, highly skilled refining technicians. Manufacturing the new Esso Extra for '55 was not simply a matter of turning a few valves or adjusting a battery of instruments. It involved a revision of the Company's entire refining schedule and blending processes.

In areas where the Company contracts for supplies of gasoline from other refiners, it was necessary for them to make revisions to meet Humble's new specifications.

Tests were conducted over thousands of miles of Texas roads and highways. Anti-knock, mileage, power, resistance to vapor lock . . . all were tested on a representative group of cars equipped with all types of transmissions and engines of various compression ratios. Tests were run in all sorts of weather in all sections of the state—in the low flatlands of the Gulf Coast, in the higher plains of West Texas and in the rugged Hill Country.

In all of the tests, Humble research men say, "the new Esso Extra for '55 exceeded the performance qualities of its predecessor by a satisfactory margin."

The story of Esso Extra for '55 is not ended. It is now being broadcast over the state by more than 8,000 Humble service station managers and salesmen, by thousands of customers, and by a continuing advertising campaign—the same formula which helped make the pre-'55 Esso Extra the best selling gasoline in Texas history.

President Hines H. Baker voiced Humble policy of continuing product leadership.

H. W. Ferguson, Refining-Sales Vice President, told merits of new gasoline.

G. A. Mabry, Advertising-Public Relations Manager, gave promotion plans.

Exploring in Southwest Texas, Humble surface geologists map rock formations exposed in a dry wash. Their work may "blaze the trail" for further exploration by geophysics or drilling and possibly lead to their ultimate goal: a new oil discovery.

THE TRAIL BLAZERS

Surface geologists exploring the wide open spaces still lead interesting, rugged lives

LIKE detectives hot on the trail of a clue, the two Humble surface geologists were following an interesting outcropping of rock across a ridge in the deep backwoods of East Texas.

The men had paused to chip at the rocks with geologic picks when a grizzled Texan, rifle held in the crook of an arm, suddenly appeared and demanded to know what they were doing on his land.

One of the two arose and began a friendly explanation: they were geologists checking prospects for oil, and they sure hoped he wouldn't mind.

Meanwhile, the other geologist had chipped out a rare fossil—a shark's tooth, millions of years old, imbedded in the deposits of some pre-historic sea.

The landowner peered suspiciously. "What you got there?" he drawled.

"Shark's tooth," replied the geologist, "perfectly preserved. Here, have a look."

But the landowner jumped in the opposite direction. "Shark's tooth? Shark's tooth! You men are crazy. Now git off my land!"

As the geologists beat a retreat, they could still hear the outraged muttering, " . . . some ol' hound dog's tooth . . . sharks! . . . plumb crazy."

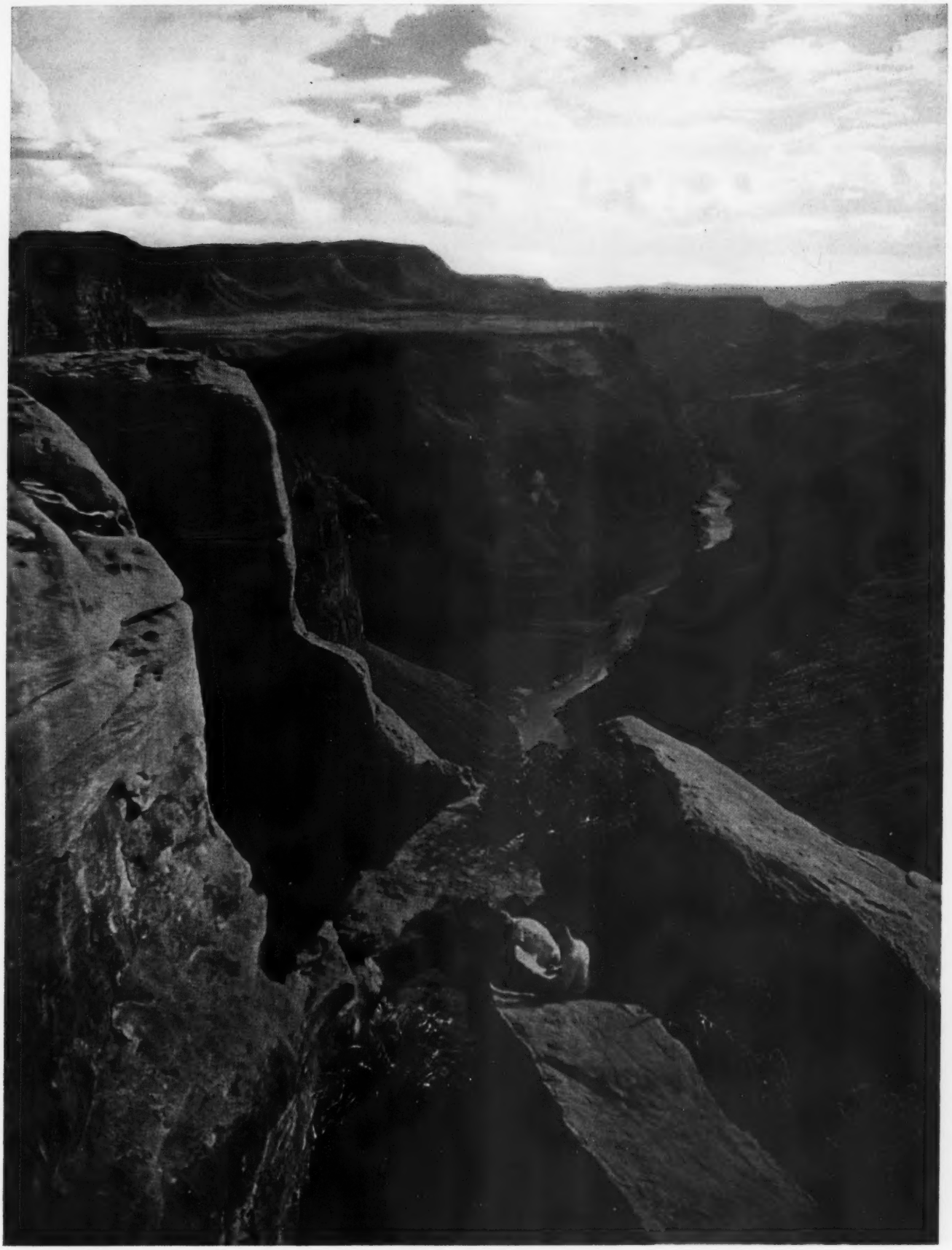
The surface geologists were amused but not particularly surprised. For as men who might be called "trail blazers" in the search for oil—as the men who explore the wide-open spaces alone and on foot—they are used to almost any experience.

EDITOR'S NOTE: This is the third and concluding article in a series about interesting experiences of exploration people in the field. The first two stories concerned gravity meter parties and seismograph crews; this article relates some tales about surface geologists.

Surface geologists could be called trail blazers in the oil industry for more than one reason. They were the first to bring a science to the search for oil, replacing the divining rods and hunches of the early wildcatters and putting the industry on a sound business basis. Their leads have opened tremendous new areas as oil-producing territory. And today, in untested sections, their surface reconnaissance is still "blazing the trail"—indicating whether further exploration by geophysics and drilling is worth undertaking.

And naturally, like other exploration people in the field, they have been exposed to more of the color and excitement of the search for oil than most groups.

The real excitement, of course, lies in the search itself. But they cannot—and will not—talk about that top-



Modern-day explorers at the Grand Canyon: surface geologists climb down sheer walls to inspect rocks at one of the very few points where nature has exposed the subsurface to view. Trip to bottom and back—6,000 feet down and up—took over 18 hours.

secret subject. *How* they work—mapping the surface formations for indications of faults or sub-surface highs and other underground traps which might contain oil—has been told before. But their experience in the field is a story in itself.

It would be impossible to report on all Humble geologists, of course, and no one story could tell all their experiences. But take E. A. Wendlandt, East Texas Division Geologist who is currently Acting Chief Geologist, for example.

Wendlandt is one of the old hands in surface geology in the Humble Company. During his days in the field he has walked the mountains and the river bottoms, the open range and farms of East Texas, West Texas, Southwest Texas, the Gulf Coast, and Louisiana; had brushes with rattlesnakes, copperheads, and cottonmouths; been cornered by angry bulls; mistaken for the law by lawbreakers and for an outlaw by a Texas posse; learned the beauty—and the cruelty—of nature first hand.

Still, Wendlandt will join with other Humble surface geologists in agreeing on one point: people are stranger than nature. Many of the geologists' most unusual experiences have resulted from chance encounters with people, like the old Texan in the shark's tooth incident.

It was Wendlandt and S. O. Burford, another senior geologist in the East Texas Division, who were ordered off the gentleman's land. Geologists are quick to point out, however, that most landowners are highly cooperative, going beyond mere helpfulness to the point of offering meals and even lodging. Indeed, the geologists could not work without their cooperation. But occasionally they come across some unusual theories about "oil on my land."

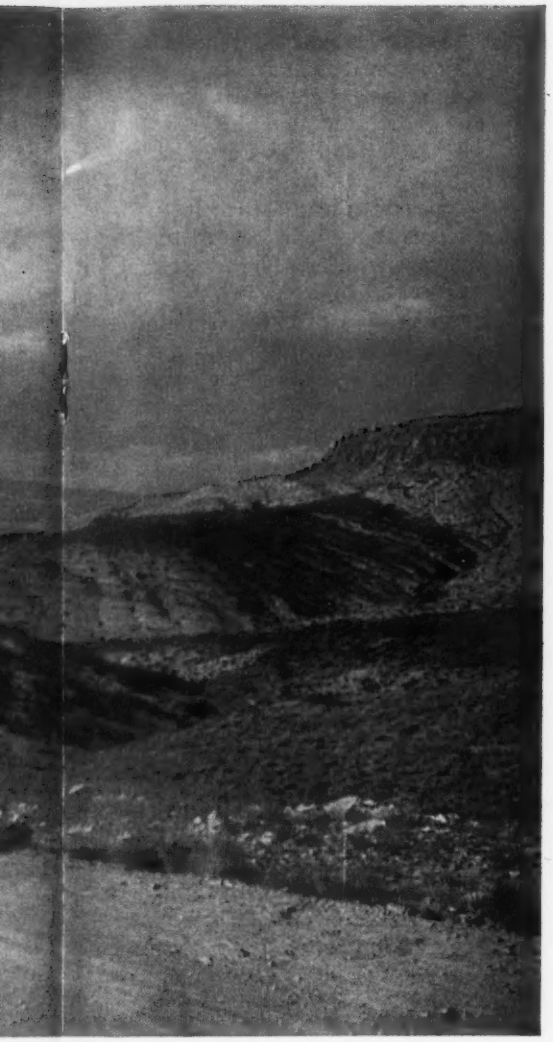
E. A. Murchison, Jr., now Louisiana Division Geologist, recalls investigating many letters reporting oil or gas seeps in Southwest Texas and West Texas. One such letter came from an old Dutchman.

"I joined him in his car to investigate," Murchison reports. "As we drove across the property, he would suddenly throw on the brakes and holler, 'Hear that! Hear that!'

"The trouble was, I couldn't hear anything. I finally realized that the old gentleman was having ear trouble. He thought the loud popping noises in his ears were gas explosions."

H. D. McCallum, Acting Division Geologist in East Texas, reports that new ideas about oil still come along to amaze him.

For example, once while working in a field near a road a car came along, stopped, and a man got out to ask the usual questions. McCallum answered that he was a geologist looking over the area.



Geologists roll into Arizona mountains for a 10-day foray away from civilization. House trailer has replaced tents of the old days, but field work is still rugged.

"Well, sonny, you're *too* late," the man informed McCallum. "Yes, sir, *Humble's* already been here. Even got a pipe line here," he said, pointing to a pipe line right-of-way nearby. "Oil's bound to be here 'cause the pipe line's all ready to go!"

It was a Humble pipe line, at that—the main line bringing oil all the way from West Texas to the tanker docks at Harbor Island. "I tried to explain," McCallum continues, "but had no luck."

"The funny thing is: We *did* find a good prospect there. We *did* lease the land. We did drill a wildcat—almost on top of the pipe line. And we *did* find oil —the Imogene field.

"Now," says McCallum, "that man is convinced that we build pipe lines before we even drill for oil. And we'll never be able to change his mind. After all, it did happen . . ."

Despite their ideas, however, people are usually most friendly to geologists—not so the wild creatures of the woods and rangelands. But working out of doors so much, surface men say they develop a kind of second sense about nature. Take this incident, for example:

Once McCallum and E. D. Pressler were working their way down a dry wash. McCallum started to jump to the bottom, "and suddenly, in mid-air, with no conscious thought on my part, I yelled 'snake!' and landed running."

The two men found clubs and walked back to the point where McCallum had landed. Sure enough, at the base of a cactus was a large rattlesnake, coiled and ready to strike.

"Old timers say you get so you can smell a snake," McCallum remarks. "I don't know about that, but I do know that for some reason, you can usually sense danger."

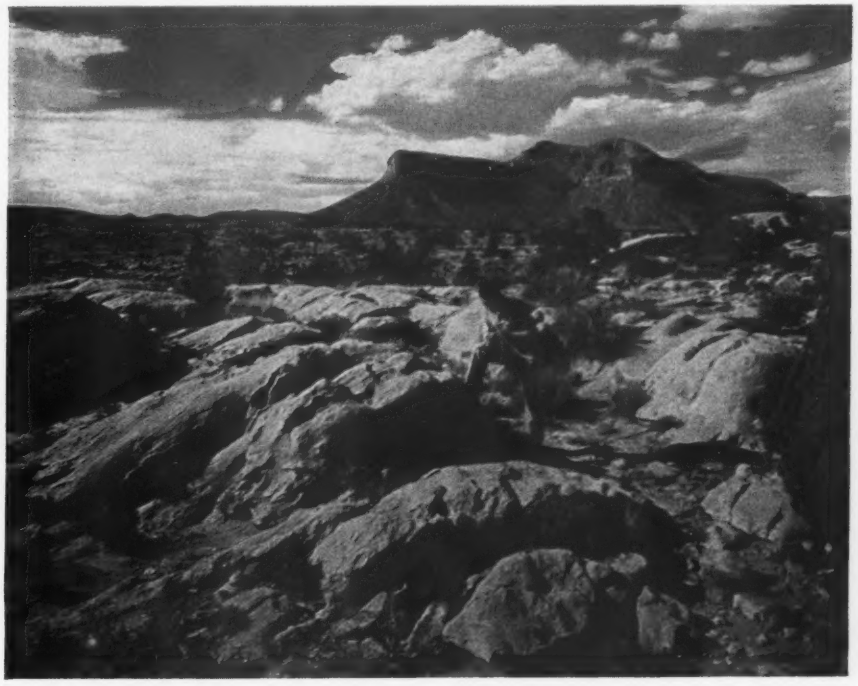
Developing this second sense takes experience, of course, which helps explain why trainees in surface geology are usually sent into the field with an old hand. W. B. Oliver, geologist in Southwest Texas, once explored a remote area with a new trainee who had never seen a snake out of a zoo.

The two left their car to examine some rocks and almost stepped on a huge snake in their path. Oliver heard a yell as the trainee ran for the car. A few moments later he was back with a rifle, axe, club, a pocket full of rocks, and a camera. "That snake didn't have a chance," Oliver laughs.

Surface geologists find other kinds of amusement in nature, too. A young geologist recently spotted something unrecognizable in a small crevice in the Texas Hill Country. He stopped, bent over, and brushed aside a few wisps of grass. Inside was a tiny field mouse, curled up and sleeping peacefully.

"As I watched," he relates, "the little fellow began waking up, acting so much like a human I had to restrain an impulse to laugh. He stretched, yawned, scratched, rolled over on his back and blinked his eyes. Suddenly he realized this horrible monster was peering in at him; his eyes popped wide open but he lay perfectly still. I figured I had frightened him enough, and as I walked away he scampered down the face of the bluff."

By and large, surface men do not consider wild game to be much of a problem—with the possible exception of



Where jeep cannot go, field boots can—and do. Here a surface geologist makes notes on limestone formations in Grand Canyon area; from notes, map will be made.

Landowners are usually most helpful to geologists; often offer food, lodging.

skunks. A far greater problem are the people who hunt the animals.

One landowner in a deer hunting area recently warned a Company geologist "not to wave at anybody."

He explained that one unfortunate visitor who "waved" had been shot through the hand: some quick-triggered hunter had mistaken his outstretched fingers for the antlers of a deer. Therefore, during hunting seasons, you will find most geologists decked out in the brightest clothing they can find.

Geologists seldom came across hunters or any other kind of people in the

Typically alone and on foot, a surface geologist explores bluffs in East Texas.

field during the early days of petroleum geology, however. In fact, it was the lack of human contacts which made the most lasting impression on surface men, particularly those working in West Texas and New Mexico. They would often "go for days without seeing a soul."

At that time many of the men found "homes" in tents, ranch shacks, or line camps as much as 50 miles from the nearest town. And those who were there declared that "loneliness was a greater problem than snakes."

To begin work, the geologists would simply take off across the open country in their Model T's 'til the going got too rough; then shift to foot power and boot leather.

These early days called for a rugged constitution. And even today, in spite of refinements that have been added, it is still a rugged life.

Last summer, for example, the Company sent two young surface geologists on a reconnaissance mission to a completely unexplored area, so far as oil is concerned—the sparsely settled territory stretching from the north rim of the Grand Canyon to the Arizona border.

The refinements in this instance consisted of a jeep, trailer, automobile, and trailer house complete with most of the appliances of the modern home. This equipment provided a comfortable base of operations for their 10-day forays away from civilization, but there was a price to pay.

"A man had to be a bit of a mechanic, electrician, cook, dishwasher, housekeeper, engineer, and bus driver to keep that outfit going," joke J. W. Adams, Jr., and B. D. Holland, the two geologists.

Sometimes parked 70 miles from the nearest accessible town, their main problem was a supply of water, which they hauled in five-gallon cans from Wolfhole Spring or one of the few other springs in the arid territory.

One of their projects was to take samples of the formations exposed in the Grand Canyon—"one of the few places where you can see the subsurface as well as the surface."

They arrived at the Canyon shortly after dawn, and walked about 20 miles —including 6,000 feet down and up— in the one day. Well, almost one day. It was 2 a.m. when the weary young men climbed over the Canyon rim.

Adams and Holland seldom met people in their daily work, but when they did the first question asked was always "Huntin' uranium?" With the natives, oil is passe in this section.

Another location where jeep transportation is required is in the Del Rio section of Texas, which R. D. Carter has been exploring.

One weekend last year Carter left the jeep at a ranchhouse and handed the keys to the owner, telling him to use it if the need arose.

Next day the disastrous Rio Grande flood struck. The rancher lost seven vehicles in the high water, and the company jeep was the only one which made it through the flood.

"You really saved our lives," was the rancher's grateful thanks.

Geologists Are Helpful

Such helpfulness is a common trait among the geologists. T. J. Burnett of the Southwest Texas Division points out that the men in the field, who are trained in first aid and carry large first-aid kits, have often been helpful when accidents and other mishaps occurred in isolated areas. Helpfulness, indeed, might be called part of the philosophy of the geologist.

Working outdoors so much, with plenty of time to think, a geologist tends to develop a special kind of philosophy, according to Burnett. "Every time you chip off the surface of an outcrop and look back through history, you see something no human has seen before. And considering the geologic ages, time ceases to have so much meaning." Perhaps explaining the geologists' usually calm attitude.

Another common trait of surface geologists—and geologists in general—is optimism. A Company official explains:

"They *have* to be optimists. Against their one to three reasons for recommending a wildcat, there are generally 10 very good reasons not to drill—*not* to spend the money.

"But to find oil you have to keep the optimistic view. You do not think so much that eight out of nine tests will fail, but that one out of nine should hit —if you are lucky."

Such optimism has paid off, for surface geology has played an active role in many of Humble's important discoveries —Charlotte, Hawkins, Talco, Bronte, Neches, and others.

Still optimistic, the surface geologists in the field continue their exploration, "blazing the trail" for more.

Using aqualungs, geologists dive to explore the sea floor off the coast of California.

UNDERWATER GEOLOGISTS

By EDNA LOU PRANG

California Area Office

FOR the field geologist who leaves no stone unturned on land, the sea presents a different problem. In order to complete his maps, he must either grow fins or find some aquatic creature to examine the rocks for him.

By employing geological divers, Humble solved this offshore problem in California and at the same time helped to introduce a new technique of geological exploration. As a result, the first half mile offshore, an area denied by law to the users of geophysical equipment, is now available for close study.

What liberates the hostile sea world to this type of investigation by the trained scientist? Not suit diving, a profession in itself, but the more adaptable aqualung developed during World War II. A geologist with aqualung equipment can learn to dive much easier than a diver can learn geology.

But before the technique of diving for geological data begins to sound like a mechanized visit to the old swimming hole, some of its hazards (most of which arise from pressure) must be admitted.

The "bends"—bubbles in the blood stream—are the disastrous effects of rising too rapidly. And nitrogen under pressure in the body affects the nervous system in a manner similar to alcohol, inviting forgetfulness and lack of caution. But the diver is carefully trained to recognize and avoid these hazards.

In practice, the divers divide into teams of three members each. For maximum safety, they use the "buddy system": two men go down together while a third remains on board a tending boat. The "dry man," also a qualified diver, acts as a party chief. He records the results as they are obtained, plans the next plunge and governs the length of dives.

Humble geologists and geophysicists accompany the undersea party by boat, taking along seismic and surface geologic maps from which they project locations of underwater rock outcrops.

The divers locate an outcrop by diving at its approximate position, arriving on the sea floor with a conventional geologic pick, a magnetic compass and an inclinometer. Rock samples obtained on the bottom are sacked and delivered to the boat on the end of a cord tied to a small buoy. Humble men aboard the craft await their catch as anxiously as any fisherman, for after all, among these samples they may find the clues that correlate data supplementing and making possible the completion of land maps.

Dressed in a rubber-foam suit and bearing aqualung equipment, the geological diver looks the part of an adventurer bound for uncharted regions. He does invade a little known world, but so far harrowing tales of escapes from sea monsters have been completely absent. The inhabitants of the deep do not seem to mind man's borrowing a few of their rocks.

Despite physical limitations, aqualung diving has advantages which make it one more effective tool in the search for oil.

Depletion...

Key to Reasonable

By Hines H. Baker*
President, Humble Oil & Refining Company

FEW subjects are as misunderstood as the depletion provisions on petroleum production. References by investment advisors to "tax-sheltered oil earnings" illustrate this lack of understanding. Such misleading statements are a threat to investments in petroleum because they endanger fair tax provisions that are essential, if reasonable returns are to be realized on the average producing operation.

The aim of income tax provisions should be fair treatment considering special circumstances rather than uniform treatment regardless of differences. Percentage depletion is an example of such provisions, but there are many others. Investment trusts, insurance companies, and timber are examples of unusual businesses taxed differently from ordinary manufacturing and trade.

A unique circumstance affecting petroleum and other minerals is the difficulty of establishing production. In most businesses a desired amount of capacity can be built for a cost ascertainable in advance. In mineral ventures we cannot know what, if anything, will result from money spent in exploration. The only certainty is that we will lose a good deal of our money. The risks are especially high for petroleum because deposits can seldom be located by surface indications. Only one well in nine drilled in the search for new fields finds *any* production. Even in development drilling there are many dry holes. Out of nearly 50,000 wells drilled annually, almost 40% are dry holes. On the average, about $2 are spent on exploration and drilling in order to realize a successful investment of $1 in producing wells. While the losses are naturally deductible in determining taxable income, such deductions offset only part of the loss and still leave a substantial amount that must be recovered somehow from successful ventures. Under the circumstances, the investment in successful oil wells alone can hardly be considered a true measure of the capital involved in establishing production.

Equitable Tax Treatment

In determining what part of the revenue from production is income subject to tax, Congress has made provisions for depletion of the oil as well as for recovery of the capital spent on the producing wells. These provisions are not "loopholes," as is sometimes falsely alleged, but deliberately designed means of providing equitable tax treatment for this peculiar business.

The principle of discovery value de-

Of nearly 50 thousand wells drilled annually, almost 40 per cent are dry holes; only one well in nine drilled in the search for new fields finds any production.

* This article written for *Investment Dealers' Digest* (issue of November 8, 1954) and reprinted by permission.

Oil exploration is an uncertain venture where capital risks are unusually high.

Returns on Petroleum Production

pletion adopted by Congress in 1918 allowed the producer to deduct as depletion the value of oil in the ground after it was discovered. In essence, this procedure granted the same depletion to an operator who discovered oil as to the operator who acquired oil by purchase after it was discovered. This provision proved difficult to administer because of disagreements over discovery value on many leases. After study of the relation between discovery value and gross revenue from petroleum production, Congress decided in 1926 that the maximum depletion allowed should be 27½% of gross income, but not more than 50% of net income. In order that the government might have the benefit of any doubt, the rate was set to represent at most the cost of buying discovered oil to replace reserves depleted by production.

The principle of percentage depletion is now generally accepted, but there are critics who believe that the rate of 27½% is too high. The best evidence of the reasonableness of this rate is in its close reflection of the value of discovered oil in the ground. On the present average price of $2.80 a barrel, the maximum percentage depletion is 77c a barrel, but the average depletion is considerably less than that because of the limitation to not more than 50% of net income. Even now the maximum amount represents no more than the cost of buying discovered oil, as it has since 1926.

Small operators unquestionably need percentage depletion, and the same provision is equally necessary and right for large companies taking exactly the same kind of risks on a larger scale. Size affords no protection against the real risks in oil exploration and development. Unfortunately, this is not like an insurance business in which results can be predicted with considerable precision by the use of mortality tables. Bitter experience teaches petroleum operators that no amount of expenditure can provide assurance of success commensurate with the money risked.

Other Tax Provisions

Another provision of the tax laws gives oil operators the option to treat intangible costs incurred in drilling as an immediately deductible expense. (Tangible assets, such as pipe or equipment, which can be salvaged for other uses are capitalized and depreciated over the useful life of the property.) This provision results in the same amount of deduction as would be realized over a period of time, if depreciation were applied instead, but it operates like accelerated amortization to encourage prompt development in this high-cost, high-risk business. This option may operate to reduce income taxes temporarily, as does any accelerated amortization, but the expenditure on successful wells serves to generate more taxable income in later years.

Contrary to popular belief, the oil industry is not fabulously profitable. It would not even be as profitable as other businesses, despite its peculiar risks, but for the fair tax provisions on production. In the period 1938-1953, the average earnings for about 90 of the largest and most successful oil companies amounted to 12.9% on net worth, or almost exactly the same rate as the average earnings for manufacturing and trade corporations. Only the highly successful operator or firm appears to be unusually profitable. Even in these cases, the earnings are not out of line with those of the most successful companies in chemicals, electrical equipment, automobiles, and other comparable growth industries.

Sheer Folly

Oil has been a great boon to us in the U. S. We are inescapably dependent upon tremendous quantities of petroleum for our national security and for improved standards of living. It would be sheer folly for this nation to endanger its economic progress and security by discouraging the development of new petroleum resources. To avoid such folly, we must maintain the tax provisions that have become a part of the economic structure of the oil business. Any change in these provisions would not only penalize oil producers and investors, but also would imperil our national security, hurt all consumers, and operate to reduce tax revenues from petroleum and related industries.

SET UP at well site, the triple-purpose workover truck will carry out complete workover operations, including wire line work, cementing, and gun perforating. As seen here, the unit is working over a Southwest Texas well and is in the process of pumping salt water into the well to circulate out all oil and gas before sealing off old perforations with cement and then re-perforating. The pump is driven by the diesel truck engine and the operation is under control of the man standing at top.

Three-in-One WORKOVER TRUCK

This special combination unit does complete well servicing job better and much cheaper

THE versatile workover truck pictured above is the only one of its kind in the world. Designed by Humble's research engineers and built to specifications by an outside contractor, this unique mobile unit can perform all the service truck operations usually required for working over any permanent completion type oil or gas well. Although it was built as an experimental model, the unit has proved so successful in field tests that it may well be the prototype of commercial service trucks of the future.

That, in fact, is the main purpose behind Humble's development of the combination unit. It is intended to demonstrate the practical economies of one-truck well servicing and so encourage commercial service companies to adopt the method. The resulting savings in workover costs would soon repay Humble's expense of development.

Normally, a workover job of the type for which this unit was designed requires at least three separate service trucks and operating crews. One truck must be called out to do the wire line work; another to do the cementing; still another for gun perforating. Often two additional trucks are needed —one to haul dry cement; the other to haul water. Inevitably there are delays when operations get off schedule; time is wasted when one truck must stand idle while another is completing its work. Since all well service companies

WIRE LINE work follows normal procedures, with reels located in rear of truck unit. Aluminum tubing, gin pole, well platform, and pipe connections are carried on the truck. Special feature is hydraulic hoist mounted on the gin pole, used in pulling tubing.

CEMENT MIXING is done in water tank built into truck. Here 12 barrels of cement slurry can be mixed at one time, stirred by a water jet propelled agitator. A covered storage bin holding 40 bags of dry cement is located near the mixing tank.

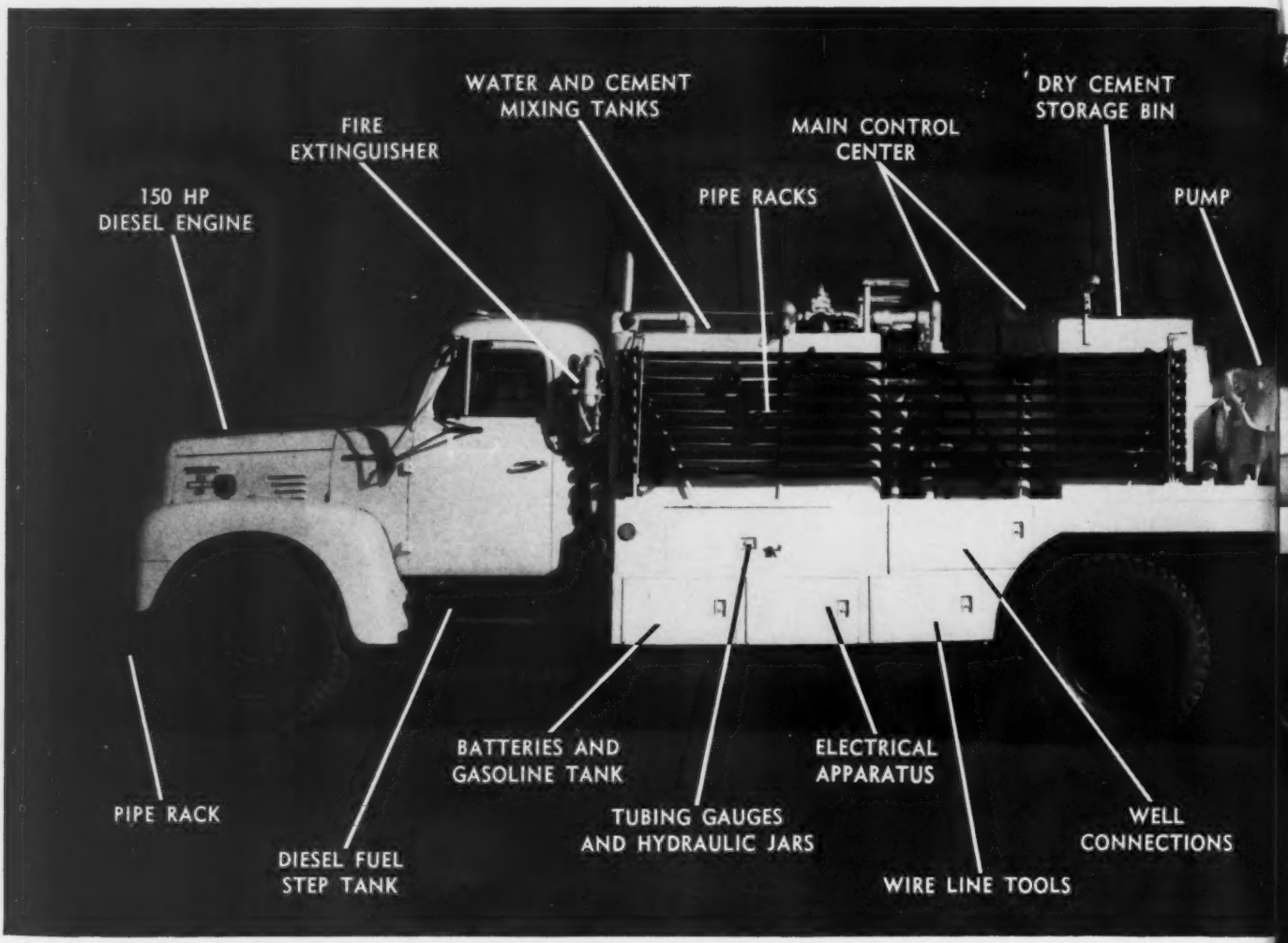
charge for their equipment and operators on an hourly basis, any waste of time represents additional expense.

With the combination workover unit, however, there are no such problems. The big truck moves onto the location under its own power, takes its position beside the ailing well, and remains there until the workover job is completed. Except for the gun perforation instruments, which are mounted for convenience in a station wagon, everything needed for the complete workover project is built into or stored on the truck. The diesel engine that propels the truck also powers the main pump. An auxiliary engine, mounted at the rear of the vehicle, powers the wire line reels and hydraulic equipment. There is a cement storage bin; also built-in water tanks which double in service as cement mixing tanks. Neatly stored in various compartments on the truck are all the tools, fittings, tubing, blowout preventers, and other equipment necessary for the job at hand.

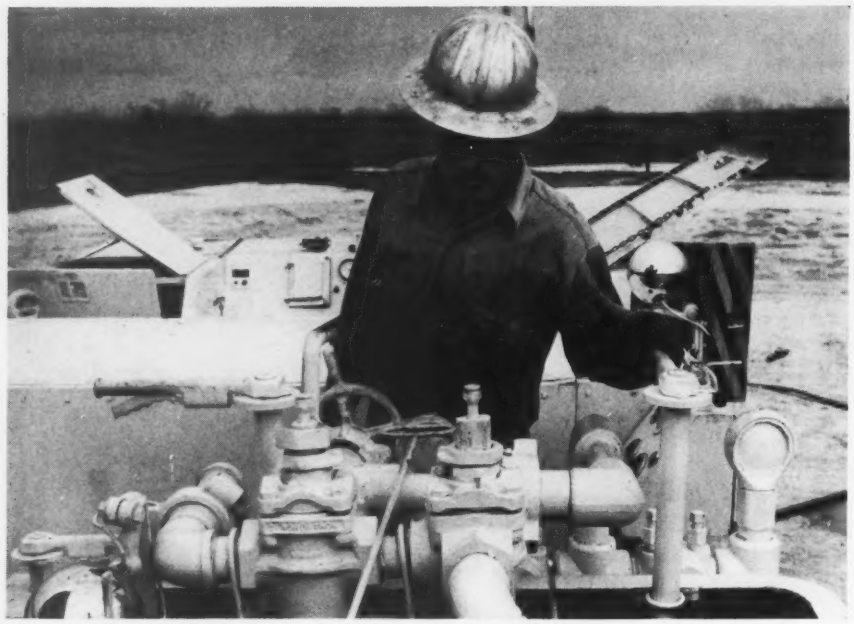
In only a few months of operation, the unusual vehicle has already demonstrated its ability to do its work better than the standard equipment, and much more economically. Judged on the basis of its limited experience to date, the combination unit bids fair to cut about two-thirds off the cost of well workovers.

GUN PERFORATING operations are carried on with aid of instruments mounted in station wagon. Man in station wagon can communicate with cable reel operator on truck through microphone. Station wagon seats swivel to face front or rear.

CONTINUED



Main features of the unique well-servicing truck are identified in this photograph. Additional storage compartments are located

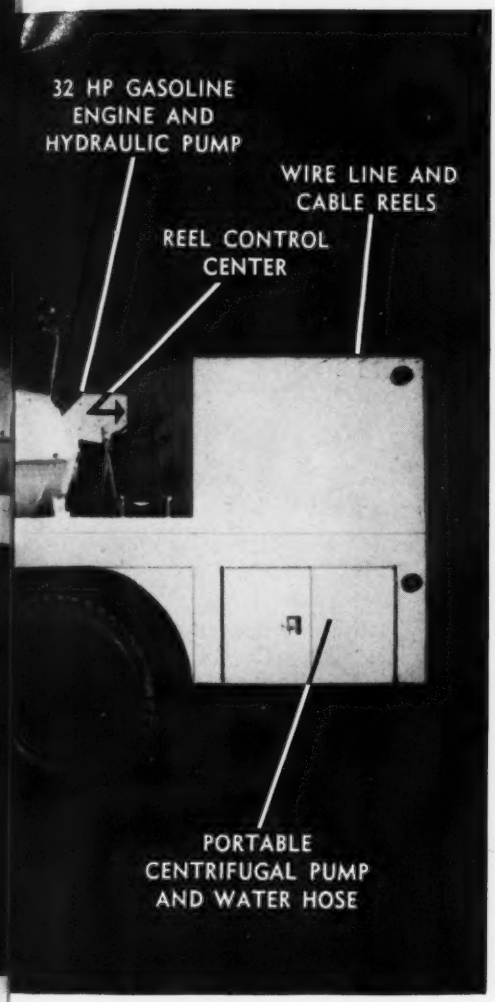


CONTROL CENTER on deck of truck gives operator complete control over the main diesel engine and all operations involving the big pump. From here he can keep a close check on pressures while circulating water, mud, or cement into the well.

BIG TRUCK POSED

One of the biggest problems in designing the workover truck was to keep it within legal weight limits allowed on public highways. Humble's engineers had to use all their ingenuity to shave excess pounds without jeopardizing the efficiency of the unit. They substituted aluminum for steel wherever possible, cut large perforations in the heavy truck frame, and juggled their plans to permit better weight distribution between front and rear axles. Finally they had a vehicle that comes safely within the legal load limits. Even so, it weighs more than 20 tons fully loaded.

But weight limitations did not prevent the engineers from including several unusual features to improve the unit's operations. A good example is the hydraulic system, powered by a 32-horsepower gasoline engine which has



on opposite side and at the rear of truck.

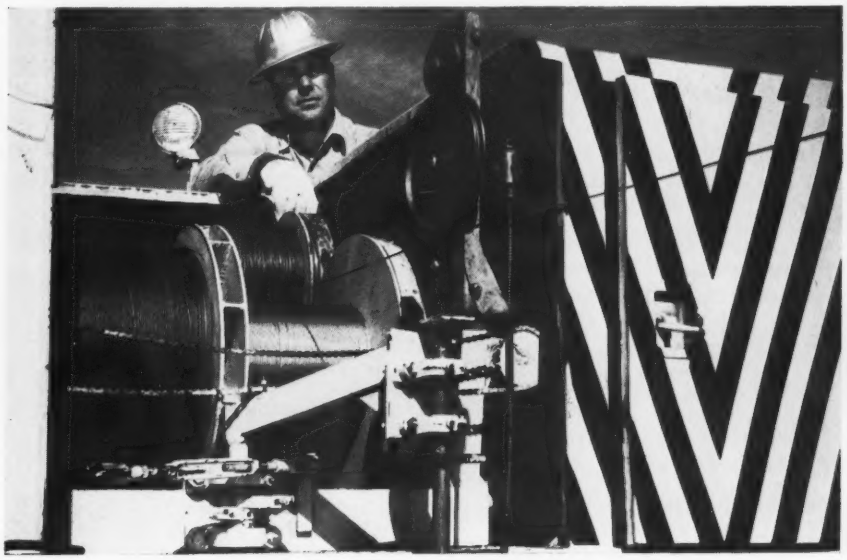
WEIGHTY PROBLEM

been spark-proofed for safety. The hydraulic system operates a vane-type hydraulic motor that controls the drum reels. This gives a smoother flow of power for wire line and cable work. An automatic by-pass valve can be adjusted so as to prevent excessive pull on the line—a valuable safety factor should a tool hang up in the well.

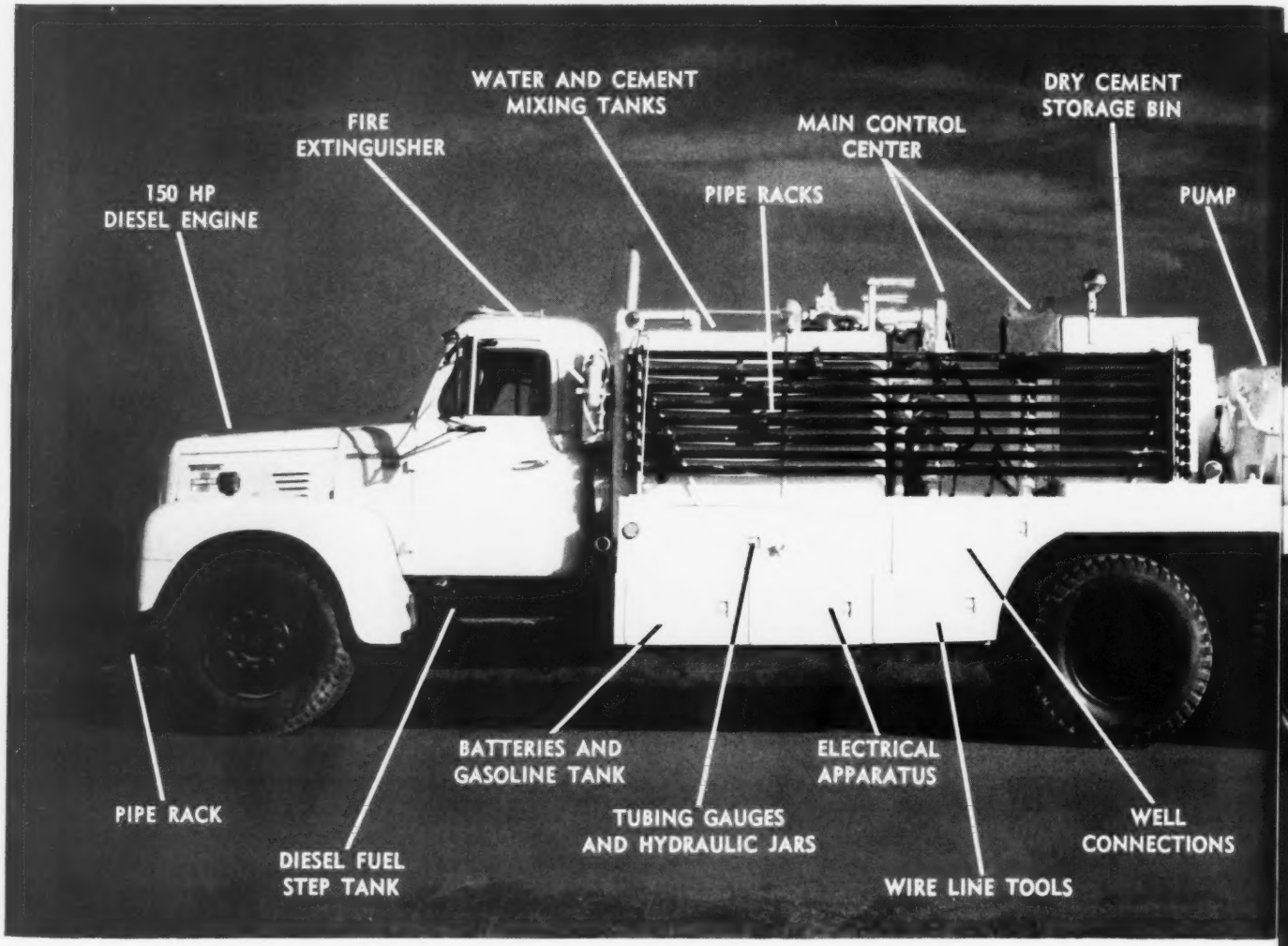
The same hydraulic system serves two other purposes. It operates the centrifugal pump that pumps water from the pit to the tank on the truck, and it drives the hoist used to pull tubing from the well.

For an experimental model, the big truck unit has proved remarkably practical in field operations. It is showing the way to more economical workovers, and that is an important factor in the overall task of keeping the nation supplied with oil.

REEL CONTROLS for wire line and perforating work face rear of truck between gasoline engine and reels. Instruments include weight indicator, control lever for hydraulic reel motor, controls for gasoline engine, and the level winder guide.



THREE SPOOLS permit variety of operations. Line being unreeled in picture is special small-diameter perforating gun cable. To the left is a spool of strand cable; top reel contains solid wire line. Single level winding guide serves all three spools.



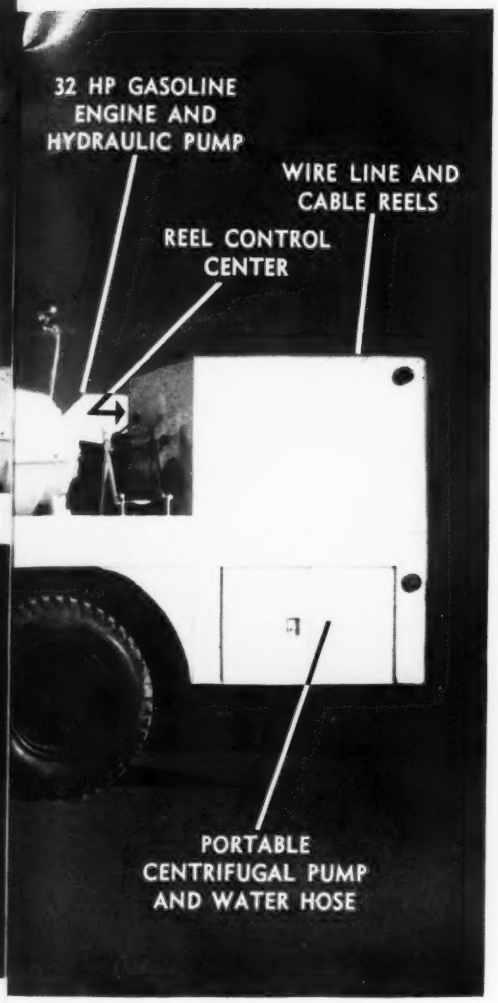
Main features of the unique well-servicing truck are identified in this photograph. Additional storage compartments are located

CONTROL CENTER on deck of truck gives operator complete control over the main diesel engine and all operations involving the big pump. From here he can keep a close check on pressures while circulating water, mud, or cement into the well.

BIG TRUCK POSED

One of the biggest problems in designing the workover truck was to keep it within legal weight limits allowed on public highways. Humble's engineers had to use all their ingenuity to shave excess pounds without jeopardizing the efficiency of the unit. They substituted aluminum for steel wherever possible, cut large perforations in the heavy truck frame, and juggled their plans to permit better weight distribution between front and rear axles. Finally they had a vehicle that comes safely within the legal load limits. Even so, it weighs more than 20 tons fully loaded.

But weight limitations did not prevent the engineers from including several unusual features to improve the unit's operations. A good example is the hydraulic system, powered by a 32-horsepower gasoline engine which has



on opposite side and at the rear of truck.

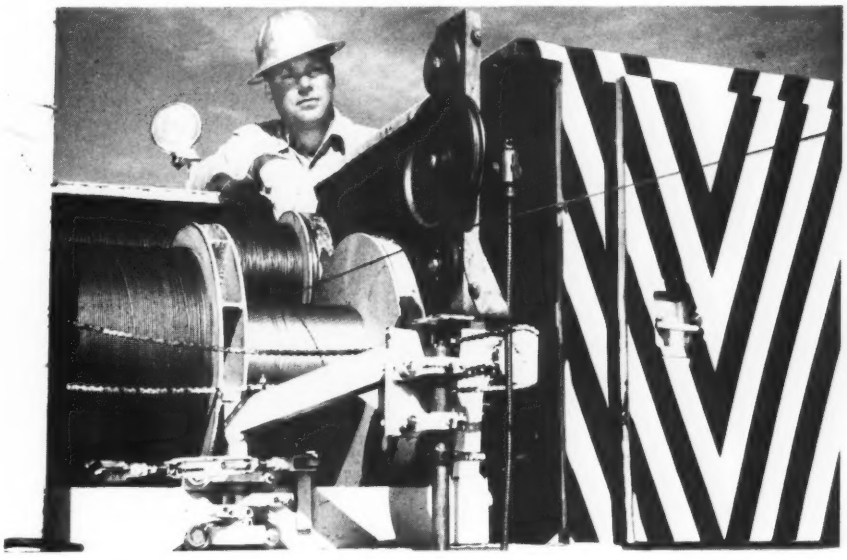
REEL CONTROLS for wire line and perforating work face rear of truck between gasoline engine and reels. Instruments include weight indicator, control lever for hydraulic reel motor, controls for gasoline engine, and the level winder guide.

WEIGHTY PROBLEM

been spark-proofed for safety. The hydraulic system operates a vane-type hydraulic motor that controls the drum reels. This gives a smoother flow of power for wire line and cable work. An automatic by-pass valve can be adjusted so as to prevent excessive pull on the line—a valuable safety factor should a tool hang up in the well.

The same hydraulic system serves two other purposes. It operates the centrifugal pump that pumps water from the pit to the tank on the truck, and it drives the hoist used to pull tubing from the well.

For an experimental model, the big truck unit has proved remarkably practical in field operations. It is showing the way to more economical workovers, and that is an important factor in the overall task of keeping the nation supplied with oil.



THREE SPOOLS permit variety of operations. Line being unreeled in picture is special small-diameter perforating gun cable. To the left is a spool of strand cable; top reel contains solid wire line. Single level winding guide serves all three spools.

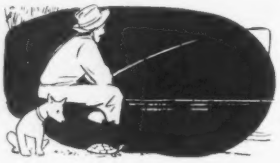
They have retired

Seventeen Humble employees join ranks of annuitants; all but one have more than 25 years of Company service

SEVENTEEN long-time employees of the Humble Companies have retired between December 14 and February 3. With one exception, each of these new annuitants has a period of service longer than 25 years.

HUMBLE PIPE LINE COMPANY

HENRY J. CALDWELL, engineer at San Angelo Station, January 17—more than 31 years. He was employed as timekeeper at San Angelo. He will work around home, visit friends and do some fishing.



EDGAR L. MONTGOMERY, engineer at Baytown, January 31—more than 32 years. He started in the Crude Oil Department at Goose Creek as a roustabout. He transferred to Humble Pipe Line Company in 1923.

CAP H. OLIVER, oiler at Comyn Station, January 31—more than 32 years. He began work as a laborer at Chaney. He was a member of groups that started the Fleming and Leach stations. His hobbies are fishing and baseball.

Employees Recently Called to Military Service

AIR FORCE

Willie J. Macon	Baytown Refinery

ARMY

Charles W. Becker, Jr.	Pipe Line—Engineering
Willard E. Fischer	Treasury
Sidney T. Hensley	Pipe Line—Accounting
John P. Holland	Flour Bluff, Production
Johnnie W. Kennedy	Exploration—Geologic
Jackie R. Kling	Baytown Refinery
Barnell W. Lange	Exploration—Geologic
Sidney S. Matske	Exploration—Geologic
Floyd D. Morrow	Conroe Gas Plant
Frank Mustachia, Jr.	Safety Division, Houston
Clifford F. Rowe, Jr.	Baytown Refinery
Lee A. Ryberg	Crude Oil Accounting
William C. Scott	Sugar Valley, Production
Ollie E. Thompson	Baytown Refinery
Rodney J. Waldt	Land Records & Rentals
Robert B. Wightman	Exploration—Geologic

NAVY

Jack W. Walker	Government Wells, Production

EARL C. SCOTT, engineer at Anahuac, February 1 — more than 35 years. He began work at Webster as a laborer. He is building a new home in Conroe, where he will pursue his hobbies of hunting and fishing.

CHARLES B. WATSON, station foreman at Agua Dulce, December 31—almost 34 years. He built a new house on a farm near Floresville, where he will raise Hereford cattle, fish, and hunt during retirement. He helped open Crane Station and become its first chief engineer. For 28 years groups under his supervision have worked without a lost-time injury.

PRODUCTION DEPARTMENT

HENRY D. BROYLES, witness gauger at Gladewater, January 24—more than 31 years. He worked for the Company at West Columbia some prior to being employed at Corsicana in 1923 as a helper. He completed a new home recently in Gladewater and plans to keep busy landscaping his yard.

HOWELL F. CAMPBELL, machinist at Tomball Natural Gas System, January 22—more than 25 years. He began work as laborer at Neches Gas Plant. He helped to start operations of this plant and the Tomball Gas Plant. He won three Coin-Your-Ideas awards and served as the Employees' Federation representative in two districts. He owns his home in Houston, where he and Mrs. Campbell plan to live.

JOEL G. DODSON, lease pumper-gauger at Gladewater, January 29—almost 31 years. He began work as a rotary helper at Corsicana. He has worked at Gladewater as a rod and tubing hoist operator, roustabout gang pusher, and pumper. He plans to raise flowers and vegetables and do some fishing.

ZACK M. WELLS, electrician first at Government Wells, January 31—more than 24 years. Mr. Wells has been a member of the Odd Fellows Lodge for 40 years. He will make his home in San Saba, Texas, where he will do some gardening and operate an electric shop.

BAYTOWN REFINERY

MACEO GREEN, laborer, January 23—more than 26 years. He began his employment in the Labor Department and later transferred to the Cracking Coils group. In 1941, he

Employees Recently Returned from Military Service

AIR FORCE

Alvin O. Berg	Baytown Refinery
Richard L. Brown	Production Accounting, Houston
Rex. G. Couch	Baytown Refinery
Charles R. Evans, Jr.	Pipe Line—Proration, Houston
Charles M. Hunt	Stationery & Reproduction, Houston
John W. Pitts	Pipe Line—Treasury, Houston
Steven O. Stubblefield	Katy, Production

ARMY

George B. Benson	Anahuac Gas Plant
Nathaniel W. Bonetti	Baytown Refinery
Lawrence D. Clark	Stationery & Reproduction, Houston
Samuel E. DuBois	Sales Accounting, Houston
John E. Dudley	Pipe Line, Cisco
James A. English	Pickton Gas Plant
Harlan N. English	Colorado, Production
James W. Grason	Government Wells, Production
Billy R. Hamilton	Exploration-Geologic
Pierce P. Hendrix, Jr.	Longview, Pipe Line
Tommie E. Herring	Baytown Refinery
Robert E. Hollaway	Baytown Refinery
Gordon E. Jones	Tomball Gas Plant
Robert C. Lauhoff	Lovell Lake, Production
Albert R. Morehead	Treasury, Houston
Robert D. Pinkston	Greta, Production
John F. Ross	Hobbs, Production
Irvin R. Shields	Avoca, Production
Charles A. Stockton	Thompsons, Production

NAVY

Robert H. Archer	Baytown Refinery
William W. Batterton, Jr.	Production Accounting, Houston
Harold V. Dressendorfer	Refining Accounting, Houston
Charles J. Haley	Exploration-Geophysics
Grover K. Haynes	Safety Division
Henry L. Hooper	Stationery & Reproduction, Houston
Calvin D. Parrish	Baytown Refinery

returned to the Labor Department. He is a member of the Baptist Church at McNair, Texas.

YNOCENCIO OVIEDO, laborer special, December 28—more than 30 years. All of his service has been in the Labor Department. He has been married 42 years; his wife is the former Bernalda Lopez. They have six children and 13 grandchildren.

ROBERT E. WITHERS, stillman first, December 14—more than 33 years. He began his employment as a waiter in the Mess Hall. He became a member of the Distillation Department in 1924. At retirement he was chief operator in this department. Mr. Withers is a long-time member of the Masonic Lodge and Missionary Baptist Church, both in Baytown.

HOUSTON OFFICE

ALBERT H. BECKER, division order clerk in Division Order & Title, February 3—more than 28 years. Mr. Becker spent fifteen months in the Armed Services during World War I, twelve of which were spent overseas in Brest, France. He joined Humble at Cisco in 1926 and moved to the Houso office in 1931. Hobbies include golf, fishing, and gardening.

WILLIAM H. ELLINGTON, SR., senior accounting clerk in Production Accounting, January 5—more than 31 years. Mr. Ellington takes an active part in church and Masonic lodge work. He joined Humble as Cisco as a clerk, and in 1930 he moved to Houston. He married the former Lillian Greer 41 years ago. They have two children and one grandchild.

THOMAS A. MURPHY, division manager in Special Products Manufacturing and Fuel Oil Terminal of the Sales Department, January 9—more than 35 years. He became manager of Fuel Oil Terminal and Special Products Manufacturing Plant in May, 1940. He helped organize the Fuel Oil & Asphalt Department of the Company in 1936 and construct the Special Products Manufacturing Plant and Fuel Oil Terminal in 1933. He plans to do some traveling during his first year of retirement.

MILTON E. ROESSLER, head distribution clerk in Pipe Line Accounting, December 21—more than 35 years. All of his service has been in Pipe Line Accounting. His hobbies are bowling and swimming, and he once rescued his wife from the Comal River at New Braunfels. He plans to build a home in southern Missouri near Bull Shoals Lake.

JOHN O. SUE, assistant manager of the Production Department, December 27—almost 30 years. Mr. Sue joined the Company as a clerk at Wortham, Texas. In 1929, he transferred to the Houston Office in the Petroleum Engineering group and worked exclusively on gas problems. On November 1, 1935, when Gas Engineering was separated from Petroleum Engineering, he became the Gas Division superintendent. Mr. Sue pioneered in gas conservation. He played a major role in negotiating the agreement for construction and operation of the jointly-owned Katy Gas Cycling Plant, the world's largest. The work of the Katy Gas Cycling Plant Committee of which Mr. Sue was chairman became a pattern for the operations of other jointly owned gas plants.

Deaths

Since the last issue of THE HUMBLE WAY, ten employees and four annuitants have died:

Employees who have died are: HARRY F. BOSSART, 47, instrument repairman at Baytown Refinery, on December 18; LEVI "G" CASH, 46, checker at Baytown Refinery, on January 3; WILEY R. HIETT, 48, supervisor at Baytown Refinery, on January 2; HOMER L. D. FARMER, 45, gas plant engineer at Pickton Gas Plant, on December 24; RAY A. KENDRICK, 42, lease pumper-gauger at Gladewater, January 24; AUGUSTIN J. LEWIS, 55, waiter in the Houston Office, on December 26; HOWARD P. MCALISTER, 62, helper first at Baytown Refinery, on December 20; GEORGE A. SMITH, 60, assistant warehouseman at Abilene Bulk Station, on December 4; "J" "E" STEPHENS, 44, pipeliner at Cisco Connection, on December 29; HUGH M. STEVENSON, 62, manager of Planning & Economics in Humble Pipe Line Company Houston Office, on January 15.

Annuitants: JOHN F. DZILSKY, 69, Contact Lube Plant foreman at Baytown Refinery before his retirement, died on December 11; ALBA A. JACKSON, 66, lease pumper-gauger at London before his retirement, died on January 5; JOHN H. KING, 66, barrel conveyor operator at Baytown Refinery before his retirement, died on January 1; CARY A. TALLEY, 61, roustabout gang pusher at Hobbs District before his retirement, died on December 8.

By the way . . .

Humble Pipe Line Employee Gets Life-Saving Award As McCamey District Celebrates New Safety Record

Sanders Qualls Lomax

The National Safety Council award for life saving—the President's Medal—was presented to H. H. "Red" Qualls, connection foreman for Humble Pipe Line Company, in a surprise ceremony in McCamey on February 18.

First to offer congratulations was William Sanders of Odessa, construction company employee whose life he saved.

Occasion for the award was a luncheon celebrating two million man hours of accident-free service compiled by Humble Pipe Line employees in the McCamey District during five and a half years of work. All employees received desk clocks for their achievement, which set a new Humble Pipe Line safety mark and is considered to be one of the top records ever compiled in the entire pipe line industry.

Presentation of the President's Medal to Qualls, who had no idea he was being considered for the award, was a highlight of the celebration.

The drama which brought Qualls and Sanders together occurred May 17, 1954, in an open field near McCamey where a construction company crew was laying a pipeline.

Sanders was working with lengths of pipe suspended from a tractor boom when the pipes came in contact with a high-voltage electric line. He was knocked to the ground unconscious and had stopped breathing when Qualls happened on the scene a few minutes later.

Quickly going into action, the Humble pipeliner applied artificial respiration — a technique learned in Company first-aid courses. After six desperate minutes, Sanders showed signs of life and was rushed to the hospital.

Despite shock and third degree burns, Sanders made a complete recovery after a month in the hospital.

The life-saving medal was presented to Qualls by O. Q. Lomax, President of Humble Pipe Line Company.

Venn Named Manager

Russell H. Venn, formerly Manager of Operations of the Refining Department, has been appointed Manager of the Refining Department, effective January 1, 1955. The appointment was announced by President Hines H. Baker on December 28.

In his new capacity, Mr. Venn is responsible to H. W. Ferguson, Director in Charge of Refining, for the operation of the Baytown Plants and for related activities in the Houston Office.

The HUMBLE WAY

Vol. X No. 5

JANUARY-FEBRUARY

1955

For Whom Is the Bell Tolling?.... 1

Star Patterns 4

A New Gasoline for Texas Motorists 8

The Trail Blazers.....10

Underwater Geologists 15

Depletion—Key to Reasonable Returns on Petroleum Production.16

Three-in-One Workover Truck....18

They Have Retired.....22

By the Way.....24

Published every other month for employees and stockholders

HUMBLE OIL & REFINING COMPANY

P. O. Box 2180, Houston 1, Texas

Board of Directors

L. T. Barrow, *Chairman*

Hines H. Baker — H. W. Ferguson
David Frame — Morgan J. Davis
J. A. Neath — C. E. Reistle, Jr.
Rex G. Baker — Richard J. Gonzalez

Officers

Hines H. Baker, *President*
L. T. Barrow, *Chairman*
David Frame, *Vice President*
J. A. Neath, *Vice President*
Rex G. Baker, *Vice President and General Counsel*
H. W. Ferguson, *Vice President*
Morgan J. Davis, *Vice President*
Richard J. Gonzalez, *Treasurer*
O. L. Luper, *Comptroller*
H. K. Arnold, *Secretary and Assistant Treasurer*
Nelson Jones, *General Attorney*

Picture Credits: Inside front and back covers and pages 6, 7, 8 (bottom), 10 through 13, 16 through 21 by Mel Coston; page 5 by Bill Toler; pages 8 (top) and 14, by Tommy Nowlin; pages 9 (top) and 24 by John White.

Art Credits: Cover painting by Bob Wygant; all other art by Harris Goode and Associates.

Wire line being checked here by Humble employee is used in working over an ailing oil well. (See story on pages 18-21.)

What's in it for *you?*

EVERY Texan profits in a large way from every barrel of crude oil and every cubic foot of natural gas produced in the State.

Directly. Taxes paid by the petroleum industry to support all agencies of the State Government, including schools, old age assistance, and welfare institutions, totaled $170 million in 1954, more than a third of all the taxes collected by the State. And, in addition, the industry pays millions in other taxes to counties, school districts, and municipalities.

Indirect profits are even greater. Industry employees receive and spend about $850 million a year; royalty and lease payments to landowners add up to $500 million. Most of this money passes promptly into trade channels.

As a result, you'll find oil dollars on every balance sheet in Texas and in every bank account, including your own.

. . . But you can't figure profits in money alone.

The *chief* profit from the production of oil and natural gas rests in what these fuels *do:* In the miles you cover with your car . . . in heat for your home . . . in the usefulness of articles made from petroleum hydrocarbons . . . in the power that moves long trains across the continent and turns the wheels of the large industrial plants.

This profit Texans share with all Americans. It is reflected in the American standard of living, which is the world's highest; and it provides a dividend of national security, because a well developed, efficiently operated petroleum industry is one of the major resources in the U. S. arsenal for national defense.

HUMBLE

HUMBLE OIL & REFINING CO. • HUMBLE PIPE LINE CO.

(This advertisement is one of a series which has been appearing in Texas newspapers and magazines. Similar advertisements were also published in other states in which Humble carries on operations.)